

What is claimed is:

- 1 1. A method for controlling exposure energy on a wafer substrate, comprising the steps of:  
2 controlling the exposure energy with a feedback process control signal of critical dimension, and  
3 further controlling the exposure energy with a feed forward process control signal of a  
4 compensation amount that compensates for wafer thickness variations.
- 1 2. The method of claim 1, further comprising the step of: combining the feed forward  
2 control signal with the feedback process control signal to control the exposure energy.
- 1 3. The method of claim 1, further comprising the step of: supplying the feed forward  
2 process control signal by a feed forward controller.
- 1 4. The method of claim 1, further comprising the step of: controlling the exposure energy by  
2 a feed forward control signal of an interlayer thickness measurement.
- 1 5. The method of claim 1, further comprising the step of: controlling the exposure energy by  
2 a feed forward control signal of an interlayer thickness measurement remaining after CMP  
3 thereof.
- 1 6. The method of claim 1, further comprising the step of: calculating the compensation  
2 amount according to a polynomial function with a coefficient of the function being based on a  
3 measurement of a remaining thickness of a planarized interlayer.
- 1 7. The method of claim 1, further comprising the step of: calculating the feedback process  
2 control signal of CD measurement of a top layer in a previous manufacturing lot.
- 1 8. The method of claim 1, further comprising the steps of: calculating the compensation  
2 amount according to a polynomial function with a coefficient of the function being based on a  
3 measurement of a remaining thickness of a planarized interlayer; and calculating the feedback  
4 process control signal of CD measurement of a top layer in a previous manufacturing lot.

- 1 9. The method of claim 1, further comprising the steps of: calculating the compensation  
2 amount according to a polynomial function with higher order coefficients set at zero.
- 1 10. The method of claim 1, further comprising the steps of: calculating the compensation  
2 amount according to a linear function.
- 1 11. The method of claim 1, further comprising the steps of: calculating the compensation  
2 amount according to a segmented linear function .
- 1 12. A system for controlling exposure energy on a wafer substrate, comprising:  
2 a feed forward controller providing a feed forward control signal to an exposure  
3 apparatus based on a thickness measurement of an interlayer of the wafer substrate for  
4 controlling the exposure energy focused on a top layer of the wafer substrate, and  
5 a feed back controller providing a feed back exposure energy control signal to the  
6 exposure apparatus based on CD measurement of a top layer of a wafer substrate of a previous  
7 manufacturing lot.
- 1 13. The system of claim 12, further comprising: a thickness measurement device providing  
2 thickness measurement data to the feed forward controller.
- 1 14. The system of claim 12, further comprising: a CD measurement device providing CD  
2 measurement data to the feedback controller.
- 1 15. The system of claim 12, further comprising:  
2 a thickness measurement device providing thickness measurement data to the feed  
3 forward controller and  
4 a CD measurement device providing CD measurement data to the feedback controller.
- 1 16. The system of claim 12, further comprising: a thickness measurement device providing  
2 thickness measurement data of an STI layer of the wafer substrate to the feed forward controller.

1 17. The system of claim 12, further comprising: a CD measurement device providing CD  
2 measurement data of a poly-gate of wafer substrates of a previous manufacturing lot.

1 18. The system of claim 12, further comprising:  
2 a thickness measurement device providing thickness measurement data of an STI layer of  
3 the wafer substrate to the feed forward controller, and  
4 a CD measurement device providing CD measurement data of a poly-gate of a previous  
5 manufacturing lot.

1 19. The system of claim 12 wherein,  
2 the feed forward controller is user configurable by having one or more polynomial  
3 coefficients set to zero in a polynomial function model.

1 20. The system of claim 12 wherein;  
2 the feed forward controller is user configurable by having one or more polynomial  
3 coefficients set to zero in a polynomial function model.

1 21. The system of claim 20, further comprising: a thickness measurement device providing  
2 thickness measurement data of an STI layer of the wafer substrate to the feed forward controller.

1 22. The system of claim 20, further comprising: a CD measurement device providing CD  
2 measurement data of a poly-gate of wafer substrates of a previous manufacturing lot.